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EXAMINER	
QI, ZHI QIANG	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 07/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/843,781	CHOI, WOO HYUK	
	Examiner	Art Unit	
	Mike Qi	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-9,12,15-19,21-24 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-9,12,15-19,21-24 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-9,12,15-19 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,303,074 (Salisbury) in view of US 5,459,410 (Henley).

Claims 1, 9, 17 and 22, Salisbury discloses (Col.7, line 42 – col.10, line 60; Fig.2B) that a repair structure for a thin film electronic display such as liquid crystal display (LCD) that the scan line or data line is required to isolate a short circuit at the crossover point between the scan line and the gate line, in which the repair structure comprising:

(concerning claims 1, 9, 17 and 22)

- date line (103) and scan line (102) and crossing each other;
- scan line (102) can be shorted to the data line (103) at crossover point (118), and the scan line (102) has been severed at severance points (160A, 160B) to electrically isolate the portion of the line with short circuit (150) from remainder of scan line (102) (such that the scan line having first, second and third segments, wherein the second segment "the middle portion" is an electrically isolated from the first and third segments and

located at a portion where the scan line and the data line overlap) (see Salisbury in col.8, line 60 – col.9, line 20 and Fig.2B);

- repair lines (122, 123) are electrically insulated from the scan line (102) and data line (103) by a dielectric material such as silicon oxide or silicon nitride (such that the repair pattern electrically isolated from the second segment of the scan line) (see Salisbury in col.7, line 65 – col.8, line 3);

(concerning claims 17 and 22)

- scan repair line (122) is electrically coupled to its associated scan line (102) at selected location (135) and at the opposite end of scan line (102) (the electrical coupling typically are through contact hole such as the contact hole (143)), thereby providing a path for electrical signal to be conducted to active components connected to scan line (102) on either side of now isolated segment of the scan line containing shorted area (150) (see Salisbury in col.9, lines 7-20 and Fig.2B);

(concerning claims 1 and 17)

- the data line (103) can be bypassed by coupling the data repair line (123) to severing the data line (103) and connecting the selected points (see Salisbury in col.9, lines 21 – 49 and Fig.2B), such that, similarly, the data line (103) also can be shorted to the scan line (102) at crossover point (118), and the date line (103) would have been severed at severance points (like the 160A, 160B) to electrically isolate the portion of the line with short circuit (150) from remainder of data line (103) (such that the

data line having first, second and third segments, wherein the second segment "the middle portion" is an electrically isolated from the first and third segments and located at a portion where the scan line and the data line overlap).

Salisbury discloses the repair principle and mainly teaches the scan line (102) has been severed at severance points (160A, 160B) to electrically isolate the portion of the line with short circuit (150) from remainder of scan line (102), and that is the same principle as the scan line having first, second and third segments, and the repair pattern electrically isolated from the middle portion (second segment) and electrically connecting the first segment with the third segment of the data line or the scan line. Conventionally, the data lines and scan lines are on a substrate for the liquid crystal display. Even though Salisbury mainly teaches the scan line has been severed, but Salisbury also indicates (col.9, lines 21-31) that likewise, an open circuit on data line (103) can be bypassed by coupling data repair line (123) to it at the selected connection points, so that similarly, the data line (103) also can be shorted to the scan line (102) at crossover point (118), and the date line (103) would have been severed at severance points (like the 160A, 160B) to electrically isolate the portion of the line with short circuit (150) from remainder of data line (103).

Salisbury does not explicitly disclose that the repair pattern bypasses to pixel electrodes adjacent to the data line and has a portion overlapping the pixel electrodes for the claims 1 and 9; and forming an insulating material to fill the portions between the second segment and the first segment of the data lines (or the scan lines) and between

the second segment and the third segment of the data lines (or the scan lines) for the claims 17 and 22.

However, Henley discloses (col.11, line 65 – col.12, line 6; Fig.12c) that a cross-short repair structure that the scan line (15) is cut at locations (80,82) to sever the short circuit, and using laser removes passivation from the scan line in areas (84,86) to form a conductive bridge (88) which contacts each area (84,86) without shorting data line (13). Because the gate line (scan line) and the data line form the pixel region, as shown in Figs.6 and 14, and the repair pattern is a conductive bridge across the pixel region as shown in Fig.12c. The figures 6 and 14 show an electrical diagram that does not show the precise distance, and the figures show that the principle of the pixel region are defined by the data line and the gate line, and normally, the desirable pixel region is as larger as possible in order to enlarge the display area. Therefore, when forming the conductive bridge, the repair pattern of the conductive bridge, inherently, bypassing to pixel electrodes adjacent to the data line; and the repair pattern of the conductive bridge, inherently, overlapping the pixel electrodes. According to the meaning of "bypass" (see Merriam-Webster's Collegiate Dictionary) that is a channel carrying a fluid around a part and back to the main stream, i.e., a shunt, such that the current goes to the shunt. Therefore, the repair pattern is a current shunt, and the repair pattern disclosed in Salisbury and Henley adjacent to the pixel electrodes and the data line, so that the repair pattern disclosed in Salisbury and Henley is bypassed to the pixel electrodes adjacent to the data line, especially, when enlarge the pixel display region, the repair pattern would overlap the pixel electrode. According to the Fig.2 of this

application, the pixel electrode (27) and (27a) are cut, so that means the repair pattern does not overlap the pixel electrode (the cut portion does not serve as pixel electrode).

Henley indicates (col.2, lines 15-18) such repair structure improving the production yields, especially, for assembling high density active matrix LCD panels.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to arrange a repair pattern as claimed in claims 1 and 9 for improving the production yields of the high density active matrix LCD display.

Concerning the limitation to fill insulating material between the first and second segment and between the thirds and second segment of the data lines or scan lines.

Salisbury disclosed (col.7, line 65 – col.8, line 3) that electrically insulating the conductive lines (such as the repair lines and the transmission lines, all of them are conductive lines) are typically by forming an intermediate layer of dielectric material such as silicon oxide or silicon nitride between the conductive lines. Such that is a conventional technique filling an insulating material between the two conductive segments in order to insulate the two conductive segments, because the insulating material has a reliable insulating property.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to fill an insulating material into the portions between the segments of the data lines or scan lines as claimed in claims 17 and 20 in order to obtain a reliable insulation between the conductive segments.

Claims 3 and 6, lacking limitation is such that the repair pattern overlapping the pixel electrodes and having a "[" shape.

However, Henley discloses (col.11, line 65 – col.12, line 6; Fig.12c) that a cross-short repair structure that the scan line (15) is cut at locations (80,82) to sever the short circuit, and using laser removes passivation from the scan line in areas (84,86) to form a conductive bridge (88) which contacts each area (84,86) without shorting data line (13). Because the gate line (scan line) and the data line form the pixel, as shown in Figs.6 and 14, and the repair pattern is a conductive bridge across the pixel region as shown in Fig.12c. The figures 6 and 14 show an electrical diagram that does not show the precise distance, and the figures show that the principle of the pixel region are defined by the data line and the gate line, and normally, the desirable pixel region is as larger as possible in order to enlarge the display area. Therefore, when forming the conductive bridge, the repair pattern of the conductive bridge, inherently, bypassing to pixel electrodes adjacent to the data line; and the repair pattern of the conductive bridge, inherently, overlapping the pixel electrodes. In order to avoid short-circuit the bridge (88) to the pixel electrodes, the overlapping portion of the pixel electrodes with the bridge (88) must be isolated from other portion of the pixel electrodes, and the repair bridge (88) has a "[" shape. According to the Fig.2 of this application, the pixel electrode (27) and (27a) are cut, so that means the repair pattern does not overlap the pixel electrode (the cut portion does not serve as pixel electrode).

Henley indicates (col.2, lines 15-18) such repair structure improving the production yields, especially, for assembling high density active matrix LCD panels.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to arrange a repair pattern as claimed in claims 3 and 6 for improving the production yields of the high density active matrix LCD display.

Claims 4, 7, 12 and 15, lacking limitation is such that the repair pattern is a "I" shape.

However, the "I" shape repair pattern that is using the same principle to cut the scan line or the data line along the upper portion of the scan line or the data line, and severing into segments to repair the cross-short circuit line between the scan line and the data line, and the repair pattern must be "I" shape, and that would have been an obvious variation.

Claim 5, Salisbury disclosed (col.7, line 65 – col.8, line 3) that electrically insulating the conductive lines (such as the repair lines and the transmission lines, all of them are conductive lines) are typically by forming an intermediate layer of dielectric material such as silicon oxide or silicon nitride between the conductive lines. Such that is a conventional technique filling an insulating material between the two conductive segments in order to insulate the two conductive segments, because the insulating material such as silicon oxide or silicon nitride has the insulating property.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to fill an insulating material into the portions between the segments of the data lines or scan lines as claimed in claim 5 in order to obtain the insulation between the conductive segments

Claims 8 and 16, Salisbury discloses (col.7, lines 65-67) that the repair lines (122, 123) are electrically conductive, and using the conductive material such as metal as the repair pattern that would have been at least obvious.

Claim 18-19 and 23-24, Salisbury discloses (col.7, lines 48 – 51) that severing or cutting (electrically isolating) of a transmission line (such as the scan line or the data line or forming a contact hole) is normally accomplished with a laser cutting, and that would have been at least obvious.

3. Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salisbury and Henley as applied to claims 1, 3-9,12,15-19 and 22-24 above, and further in view of US 5,407,701 (Baum et al).

Claims 21 and 26, lacking limitation is such that using laser to form the repair pattern.

However, Baum discloses (col.1 line 30 – col.2, line 42) that in laser-induced chemical vapor deposition (LCVD), a focused laser is utilized to heat the surface of a substrate at an open region between two separated circuit lines in the presence of a gaseous reactive compound, so that the formation of an interconnecting circuit line has high electrical conductivity and high metallic purity without any carbon/oxygen incorporation.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use laser-induced chemical vapor deposition for the repair pattern as claimed in claims 21 and 26 for achieving high electrical conductivity in the formation of the interconnecting circuit lines such as the data line or the scan line.

Response to Arguments

4. Applicant's arguments filed on Jun.23, 2004 have been fully considered but they are not persuasive.

Applicant's arguments are as follows:

1) The references do not teach or suggest that the repair pattern bypasses to pixel electrodes adjacent to the data line (or scan line) and has a portion overlapping the pixel electrodes as claimed in claims 1 and 9.

2) The references do not teach or suggest that forming an insulating material to fill portions between the first and second segments of the data lines (or the scan lines) and between the second and third segments of the data lines (or the scan lines) as claimed in claims 17 and 22.

3) The office action does not show any motivation to combine the references.

Examiner's responses to Applicant's arguments are as follows:

1) The reference Henley discloses (col.11, line 65 – col.12, line 6; Fig.12c) a cross-short repair structure that the scan line (15) is cut at locations (80,82) to sever the short circuit, and using laser removes passivation from the scan line in areas (84,86) to form a conductive bridge (88) which contacts each area (84,86) without shorting data line (13). Because the gate line (scan line) and the data line form the pixel region, as shown in Figs.6 and 14, and the repair pattern is a conductive bridge across the pixel region as shown in Fig.12c. The figures 6 and 14 show an electrical diagram that does not show the precise distance, and the figures show that the principle of the pixel region

are defined by the data line and the gate line, and normally, the desirable pixel region is as larger as possible in order to enlarge the display area. Therefore, when forming the conductive bridge, the repair pattern of the conductive bridge, inherently, bypassing to pixel electrodes adjacent to the data line, and the repair pattern of the conductive bridge, inherently, overlapping the pixel electrodes. According to the meaning of "bypass" (see Merriam-Webster's Collegiate Dictionary) that is a channel carrying a fluid around a part and back to the main stream, i.e., a shunt, such that the current goes to the shunt. Therefore, the repair pattern is a current shunt, and the repair pattern disclosed in Salisbury and Henley adjacent to the pixel electrodes and the data line, so that the repair pattern disclosed in Salisbury and Henley is bypassed to the pixel electrodes adjacent to the data line, especially, when enlarge the pixel display region, the repair pattern would overlap the pixel electrode. According to the Fig.2 of this application, the pixel electrode (27) and (27a) are cut, so that means the repair pattern does not overlap the pixel electrode (the cut portion does not serve as pixel electrode). Henley indicates (col.2, lines 15-18) such repair structure improving the production yields, especially, for assembling high density active matrix LCD panels.

2) Salisbury disclosed (col.7, line 65 – col.8, line 3) that electrically insulating the conductive lines (such as the repair lines and the transmission lines, all of them are conductive lines) are typically by forming an intermediate layer of dielectric material such as silicon oxide or silicon nitride between the conductive lines. Such that is a conventional technique filling an insulating material between the two conductive

segments in order to insulate the two conductive segments, because the insulating material such as silicon oxide or silicon nitride has a reliable insulating property.

3) In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the reference Salisbury discloses (col.1, line 48 – col.5, line 57) that a short circuit between a data line and a scan line leads to inaccurate signals being applied to all switching transistors connected to either of the shorted data line or scan line. Salisbury disclosed a same principle to form the repair pattern as this application. The reference Henley discloses (col.1, line 24 – col.4, line 3) that conventional display panel manufacturing yields have been unsatisfactory, causing display panel cost to be a large portion of the final cost. The reference Henley discloses a method for testing and repairing an active matrix LCD panel using conductive bridge by laser to isolate the short circuit, and such that improves the production yields, especially for assembling high density active matrix LCD panel, and that would be the benefit for producing this invention, and the motivation exists.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi
July 19, 2004

TARIFUR R. CHOWDHURY
PRIMARY EXAMINER